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Embedded Based Automatic Cylinder booking with Alert System

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Abstract : This project is used to monitor continuous weight of the LPG cylinder. In our country many times it happens that people don't know exactly the status of cylinder and there is a delay in informing gas agency. To avoid such situations we have implemented the project called "Embedded Based Automatic Gas Booking System". In this project we have used load cell as a weight sensor. This sensor will be placed below the LPG cylinder.LM35 as a temperature sensor which detects the temperature of the room and MQ6 as a LPG leakage sensor which will detect the leakage of LPG and provides security to people.

Keywords: *ATMega16, Temperature sensor, GSM Modem, Gas Sensor, Load Cell.*

I. INTRODUCTION

There are approximately 30Crore LPG users in our country. The main objective of our project is to continuously measures the weight of the cylinder by load cell and when the weight of the cylinder goes below the set value it sends message to the gas agency for the booking and another message to the owner. It also reduces the human efforts also became easy for illiterate person. When the temperature of the room goes above 50C it
turns ON the buzzer and sends message"Your kitchen temperature is very high than normal" to the owner. The main purpose of our project is to avoid accidents due to leakage of LPG as safety is an important part. This system is also detects LPG gases such as butane and propane. The range of MQ6 sensor is from 200-10000 ppm. When the level of butane goes above 600 ppm which is considered as dangerous for human the system sends a message "LPG leakage is detected in your kitchen" to the owner.

II. LITERATURE REVIEW

In year 2011, the project "Design and Implementation of an Economic Gas Leakage Detector" was developed by A.MAHALINGAM, R.T.NAAYAGI, N.E.MASTORAKIS .This project detects the gas leakage and provide immediate alarm or intimation to the user.

Later in 2013, some people developed project for home safety. This system detect the LPG leakage and alert the owner about the leak by buzzer.

In 2014 Hitendra Rewat , Ashish Kushwah ,Khyati Asthan, Akansha Shivhare designed a system which sends SMS for leakage and fire to the registered number.

III. DESIGN AND IMPLEMENTATION

This method consists of weight measurement module, microcontroller gas leakage detection system, GSM module and alert system. Which are used for automatic booking real time LPG measurement monitoring system and LPG leakage.

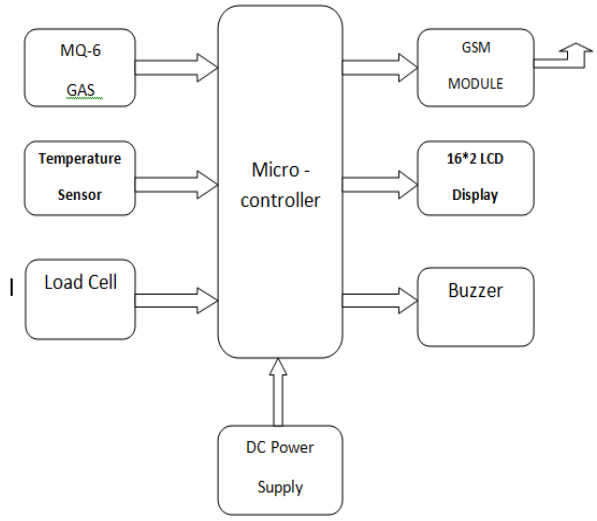

Fig 1: Block Diagram of Proposed System

The main basic ATMega16 micro controller requires the power supply ranging can be either from an ac to dc adapter or battery. The Main platform we are using to build the project is ATMega16 Microcontroller which gives us the flexibility to write the code more effectively in convenient way. It also provides us features like Inexpensive, Cross platform, Simpler and clear programming environment, Open source and extensible software easy for beginners. Microcontroller simply connect it to a computer with a USB cable or power it with a AC to-DC adapter or battery to get started. The another main component we are using in our project is use of Load cell. A load cell is a transducer that is used to convert a applied load (force) into electrical signal, which is used to measure weight of a LPG gas cylinder.

In this project, Gas Sensor is use to detect the leakage of the LPG Gas (Methane & Propane) which converts one signal into other form of signal. The LM35 series IC (temperature IC) output which is linearly proportional to the Centigrade temperature. LCD (Liquid Crystal Display) is used to show the output results of Different sensor values. We are using GSM Modem for alert the user by sending SMS (Short Message Service) about Gas Leakage and LPG cylinder booking.GSM uses of time division multiple access (TDMA) and is the most widely used of the technologies (TDMA, GSM, and CDMA).

This system continuously measures the weight of the cylinder and once it reaches minimum threshold it will automatically sends message to the authorized LPG Agent so that they can deliver the LPG cylinder in time.

3.1 Microcontroller (AT MEGA 16)

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines 16KB of programmable flash memory, 1KB SRAM, 512B EEPROM, an 8-channel 10-bit A/D converter, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD. ATmega16 has various in-built peripherals like USART, ADC, Analog Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals.

The microcontroller is the heart of the circuit. It controls all the functions of the circuit. It interfaces the Max232 serially and retrieves the data coming from PC/Laptop via Max232. Max232 is explained in part B of section III. Any input data from the PC/Laptop is detected by the microcontroller and according to that data frequent actions will be taken. The microcontroller sends the real time, alarm time and data to be displayed on the display unit. When the alarm time matches with the real time then the bell will ring and the data will be displayed on the display unit.

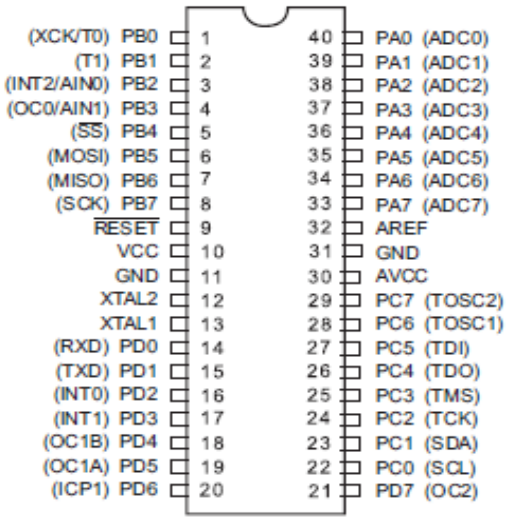

Fig.2 Pin diagram of Microcontroller ATmega16.

3.2 MQ-6 Sensor

Gas sensor is a device which is used to sense gas leakage of its surroundings. The MQ6 gas sensor is highly sensitive to petroleum based gases and less sensitive to alcohol is carbon dioxide .MQ6 sensor works on basis of combustion process, and output is given in variable voltage form. It is analog so we have to convert it from A to D because AtMega16 is digital. So it is connected to port A.

3.3 GSM Module

GSM/GPRS TTL modems SIM900 quard-band GSM/GPRS device, works on frequency 850 MHZ,900HZ,800MHZ & 1900HZ.It is very compact in size & easy to use as plug in GSM Modem. The modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows user to directly interface with 5V microcontrollers as well as 3V3 microcontrollers.

Fig 3 : GSM SIM900A Module

3.4 Load Cell

A load cell is described as a "weight measurement device necessary for electronics scale display weights in digits." Load cell is an idle transducer/sensor which converts applied force into electrical signals. Load cell works on fluid pressure, elasticity and magneto static effect or piezoelectric effect.

3.5 Temperature Sensor

LM-35 is an integrated circuit sensor that can be used to measure the temperature with an electrical output proportional to temperature.LM35 generates high output voltage than thermocouples.

3.6. LCD Display

We all know about LCD's, but no one knows the exact working of it. LCD is finding wide extends use replacing LEDs. These are described for being used with the microcontrollers, which makes they can't be activated by standard IC circuit. They are used for writing different messages on small size LCD.

IV. RESULT AND CONCLUSION

In this paper we have used automatic gas booking with alert system without human intervention. Our system helps customers to upgrade their safety and protect life and property from reputed accidents. The main objective of our system is to measure the gas present in cylinder when the weight of cylinder is below the fixed load by using weight sensor. The gas agency gets the order of new cylinder and owner received the messages regarding the status .Thus the system developed by us will somehow help the LPG Gas consumer to lead a safety life and comfortable life.

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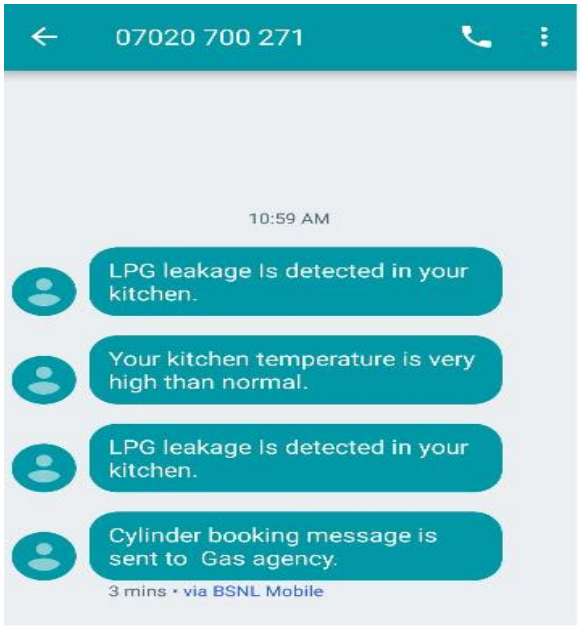

Fig 4 :SMS"s sent to the user mobile

The above figure represents SMS messages on user mobile phone, send by GSM module for different kinds of reaction of our project. The message "**CYLINDER BOOKING MESSAGE IS SENT TO GAS AGENCY"** is sent to the user when the LPG gas reaches to minimum threshold level. So the user comes to know Cylinder booking is done. The

message "**LPG LEAKAGE IS DETECTED IN YOUR KITCHEN**" is sent to user when LPG gas leakage in kitchen is found by system. The message" **YOUR KITCHEN TEMPERATURE IS VERY HIGH THAN NORMAL**" is sent to user when rise in kitchen temperature is found by the system.

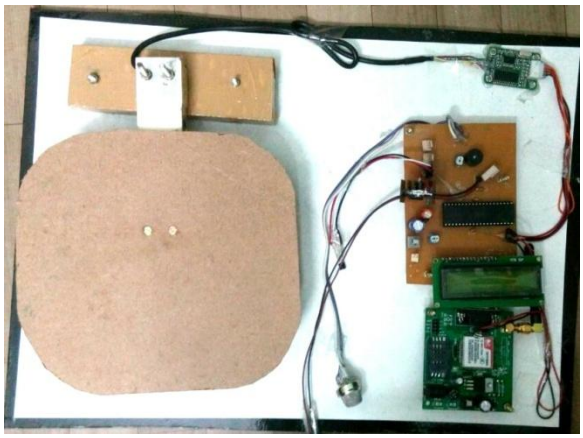

Fig 5: Final Design of the Project

V. FUTURE SCOPE

Voice feedback system can be included in GSM based LPG weight and LPG leakage detection system. User will get intimation through pre-recorded voice messages like the weight of gas Cylinder is ABC kg.

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